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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/767,798	01/29/2004	Neil G. Murray JR.	TRW(TE)6888	7228

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EXAMINER
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VERBITSKY, GAIL KAPLAN

ART UNIT	PAPER NUMBER
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2859

SHORTENED STATUTORY PERIOD OF RESPONSE	MAIL DATE	DELIVERY MODE
3 MONTHS	04/23/2007	PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	Application No. 10/767,798	Applicant(s) MURRAY ET AL.	
	Examiner Gail Verbitsky	Art Unit 2859	

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 01/10/2007
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-8, 13-21 and 24-~~29~~<sup>32</sup> is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-8, 13-21, 24-~~29~~<sup>32</sup> is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)          | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)          | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____  | 6) <input type="checkbox"/> Other: _____                          |

**DETAILED ACTION**

***Claim Rejections - 35 USC § 102***

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4, 13-15, 20-21, 26, 29-32 are rejected under 35 U.S.C. 102(b) as being anticipated by Messler (U.S. 20040114662).

Messler discloses in Figs. 1, 4 a device/ method in the field of applicant's endeavor of positioning two plastic pieces 11 and 12 to abut each other in a weld and applying a laser beam 20, the plastic piece 12 is absorbent to the laser radiation. An inspection radiation device 30, 31 is used during welding (as the weld being formed) for testing of the welding process (para [0011]). The piece (second) 11 is transparent to the laser beam. Messler also teaching to have a feedback to a welding apparatus (weld controller) in order to regulate the laser beam intensity/ modifying the heating if a signal (parameter/ temperature) is too high (outside desired or upper threshold or lower threshold). It is inherent, that the device is used for obtaining a thermal image (predetermined wavelength corresponding to the IR) of the entire weld in order to determine (parameter) the integrity/ quality of the weld. It is inherent, that having said thermal image of the entire weld would ensure obtaining temperature at different points of the entire weld.

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For claim 13: It is inherent, that the weld should be heated by the laser beam a plurality of time at a plurality of points in order to create a weld having a desired length.

For claim 15: It is inherent that the controller would compare the measured radiation with a threshold or desired radiation in order to determine if there is lack of quality (fails to meet the requirements), as very well known in the art.

For claim 29: the laser beam is reflected by a reflective device (mirrors) as described in para [0034].

The method step will be met during the normal operation of the device stated above.

***Claim Rejections - 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Messler in view of Hashimoto.

Messler discloses the device/ method as stated above.

Messler does not explicitly teach an alarm.

Hashimoto discloses in Fig. 1 a method/ device for monitoring quality of a weld comprising heating the weld and immediately (substantially simultaneously) acquiring a thermal distribution signal on another side of a second piece (col. 2, lines 25-33). The device also has a feedback control for analyzing the data and determining if the data

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meets an associated criterion, and modifying the heating/ cooling and providing a warning signal/ alarm.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add an alarm, disclosed by Messler, so as to notify the operator about failure and to allow the operator to control defects, lack of integrity of the weld caused by improper welding process/ improper heating by controlling the weld temperature within predetermined (desired/ standard) limits.

The method step will be met during the normal operation of the device stated above.

5. Claims 7, 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Messler in view of Schepard.

Messler discloses the device/ method as stated above.

Messler does not explicitly teach the limitations (determining width) of claims 7 and 18.

Schepard discloses a device in the field of applicant's endeavor, the device can be used to determine the size (thus, inherently, width) of the weld and the quality (presence of cracks, voids, defects, discontinuities) of the bond (col. 7, lines 1-2) and, inherently, compare them to the threshold (standard) by means of the histogram.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to add a feature capable of determining the size of the weld, as taught by Schepard, so as to control the size of the weld, and thus the quality of the weld, because the proper weld size is very important in some miniature applications.

The method step will be met during the normal operation of the device stated above.

6. Claims 8, 19 are rejected under 35 U.S.C. 103(a) as being unpatentable over Messler and Schepard in view of Traub.

Messler discloses the device/ method as stated above.

Messler does not explicitly the limitations of claims 8 and 19, i.e., determining that a parameter (width) is outside of the threshold.

Traub teaches a device / method in the field of applicant's endeavor wherein, in an automatic mode, a thermal signal (parameter) from a weld is compared to a signal recorded in memory (reference/ threshold), if the signal is higher or lower than the reference (does not meet an associated criterion), welding parameters are being adjusted by a (feedback) control circuitry (weld controller).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the controller of the device, disclosed by Messler and Schepard, so as to have a feedback weld controller, as taught by Traub, in order to enable the device not only to detect failure but also to implement corrective functions.

The method step will be met during the normal operation of the device stated above.

7. Claims 24 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Messler in view of Ish-Shalom et al. (U.S. 6299346) [Ish-Shalom].

Messler discloses the device and method as stated above.

Messler does not teach the limitations of claims 24 and 28.

Ish-Shalom discloses a device wherein in order to obtaining a correct temperature (thermal data) of a test sample (wafer), an IR wavelengths from the heating lamps cut off (filtered).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device, disclosed by Messler, so as to cut off the heating radiation from the final thermal data results, as taught by Ish-Shalom, in order to preserve the accuracy of the thermal data, as already suggested by Ish-Shalom.

The method steps will be met during the normal operation of the device stated above.

8. Claim 25 is rejected under 35 U.S.C. 103(a) as being unpatentable over Messler in view of Emmelmann (U.S. 6201211).

Messler discloses the device and method as stated above.

Messler does not explicitly teach the limitations of claim 25.

Emmelmann discloses in Fig.1 a device in the field of applicant's endeavor comprising an up/ down movable laser welding head/ beam for properly focusing the laser beam. This would imply, that the level of laser energy changes with the laser beam movement.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device, disclosed by Messler, so as to have a movable laser welding beam, as taught by Emmelmann, in order to properly focus the laser beam over the weld, as already suggested by Emmelmann, in order to adjust the distance and thus, the laser energy/ heat delivered to the weld.

The method step will be met during the normal operation of the device stated above.

9. Claims 5-6, 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Messler in view of Shepard (U.S. 200201724410).

Messler discloses the device and method as stated above.

Messler does not explicitly teach determining time of taking an image.

Shepard teaches to obtain thermal images over time and sample them over time in order to reconstruct the entire image. This would suggest that Schepard determines the time of taking the particular image.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device/ method disclosed by Messler, so as to take an image at a time, as taught by Schepard, in order to obtain a time temperature function which would allow the operator to determine heat conductivity/ diffusion of the weld and thus, it's quality, as very well known in the art.

The method step will be met during the normal operation of the device stated above.

10. Claim 27 is rejected under 35 U.S.C. 103(a) as being unpatentable over Messler in view of Sandvoss.

Messler discloses the device and method as stated above.

Messler does not explicitly teach the limitations of claim 27.

Sandvoss discloses a device/ method in the field of applicant's endeavor comprising heating a weld with a laser beam. The laser heat can be regulated by intensity, duration or speed of the moving laser beam (col. 3, lines 4-7).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the IR thermal data means, disclosed by



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Messler, so as to regulate heating by varying duration, intensity or the speed of the laser beam, as taught by Sandvoss, so as to provide the operator with an appropriate method of regulating of the heat, as very well known in the art.

The method step will be met during the normal operation of the device stated above.

### ***Response to Arguments***

11. Applicant's arguments with respect to claims 1-8, 12-21 and 24-32 have been considered but are moot in view of the new ground(s) of rejection.

### ***Conclusion***

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The prior art cited in the PTO-892 and not mentioned above disclose related devices and methods.

**Takeda et al. (U.S. 6462299)** discloses the device and method in the field of applicant's endeavor comprising pieces 1a and 1b abutting each other for forming a weld (pool) and heating them with an induction heating apparatus 9 while the temperature is raised to a predetermined (annealing) temperature. This would imply, that the heating and temperature measurements (thermal image) are done simultaneously.

**Geler et al. (U.S. 5474225)** discloses the device and method in the field of applicant's endeavor. Geler monitors a just completed weld.

**Jones (U.S. 4224499)** discloses the device and method in the field of applicant's endeavor comprising a copper and an aluminum pieces butt-welded. The process involving heating and melting (pool formation) their interface. Jones does not teach to take IR images simultaneously with heating.

**Juret et al. (U.S. 6177649)** teaches to monitor a welding process by obtaining thermal images by using an IR camera in real time (simultaneously). Juret teaches to monitor the quality of weld and control the welding process. If a defect of the weld is noted (weld does not meet a required criteria), the weld head should be repaired (changing variables).

**Shepard (U.S. 6585146)** discloses in Fig. 1 a device/ method for monitoring quality of weld 106 being formed between first and second pieces (surfaces) 104a and 104b of a material 104. The method comprising the steps of heating the material 104 and the weld

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106 with a heating source 102, collecting an infrared radiation (infrared wavelengths) passing through the material on the second surface (second piece) 104b, obtaining an image (plurality of images/ thermal data) by a camera 108, and analyzing the image by a computer 112. This would imply, that the camera captures the weld/ weld pool image in its entirety (thermal image/ temperature of each portion of the weld pool).

**Chande et al. (U.S. 4817020)** [hereinafter Chande] discloses in Fig. 3 a device/ method in the field of applicant's endeavor wherein a characteristic/ process parameter corresponding to a quality of the weld is a cooling rate (col. 1, lines 12-30). Chande teaches to obtain a real-time thermal image/ simultaneously with directing/ heating by a laser beam (col. 6, lines 45-68, col. 14, line 68), analyzing the image and providing a feedback to a weld controller, such that modifying a cooling rate (thus heating) in response to a feedback signal. This would imply that the thermal image (temperature) is being somehow compared with an image standard/ predetermined or desired image or threshold. Chande states that other thermal imagers can be used (col. 14, line 68, col. 15, lines 1-3).

**Dostoomian** discloses the device and method in the field of applicant's endeavor comprising welding together two materials in a localized spot by providing a heating energy (by spot welders), and monitoring the spot (pool) for quality by obtaining an IR energy (thermal data) from the pool. This would imply that the device has a means for obtaining the thermal data. The device comprises a controller which adjusting the heating energy (magnitude of the weld current) by obtaining an IR energy/ temperature from the welding tips, while the IR energy provides a measure of the temperature (thermal data) of the weld (col. 3, lines 5-6). The controller has a differential circuit for generating an error signal and apply (feedback) it to the input of the spot welder (heater) throughout the course of the welding operation (heating) in response to the thermal data /temperature evaluation of the weld as compared to the standard thermal history stored in a memory and controlling (modifying) the welding current (heating) as required (in response to the feedback signal).

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Any inquiry concerning this communication should be directed to the Examiner Verbitsky who can be reached at (571) 272-2253 Monday through Friday 8:00 to 4:00 ET.

GKV

Gail Verbitsky

Primary Patent Examiner, TC 2800

A handwritten signature in black ink, appearing to read 'G. Verbitsky', written over the printed name.

April 10, 2007